Summary of Progresses

Xiaodong Jiang

- BigBite has been taking data for Gen.
- Background rates set limits for experiment. Wire chamber performance is the key factor in the Transversity experiments.
- Understanding of BigBite tracking and optics.
- Transversity floor plan and hardware design.
- Target design progress.
- Progress on HRS-RICH detector.

Transversity Preparation

- A clear hardware preparation deadline: installation starts on May 26th, 2007. There's only 13 months left.
- We have very limited time for commissioning and debugging (a few days).
- Keep it simple. Have a working minimum set-up first before making improvements.
- Avoid uncertainties in subsystem design.
- Whatever works during Gen, don't change it unless there's a good reason.

BigBite Operation in Gen

- Bogdan will discuss on BigBite operation experiences.
- Nilanga will discuss more on BigBite wire chamber operation.
- Brandon will discuss on the current status of BigBite tracking.
- Xin will discuss BigBite single-arm optics analysis from Gen data.

What we should do: #1

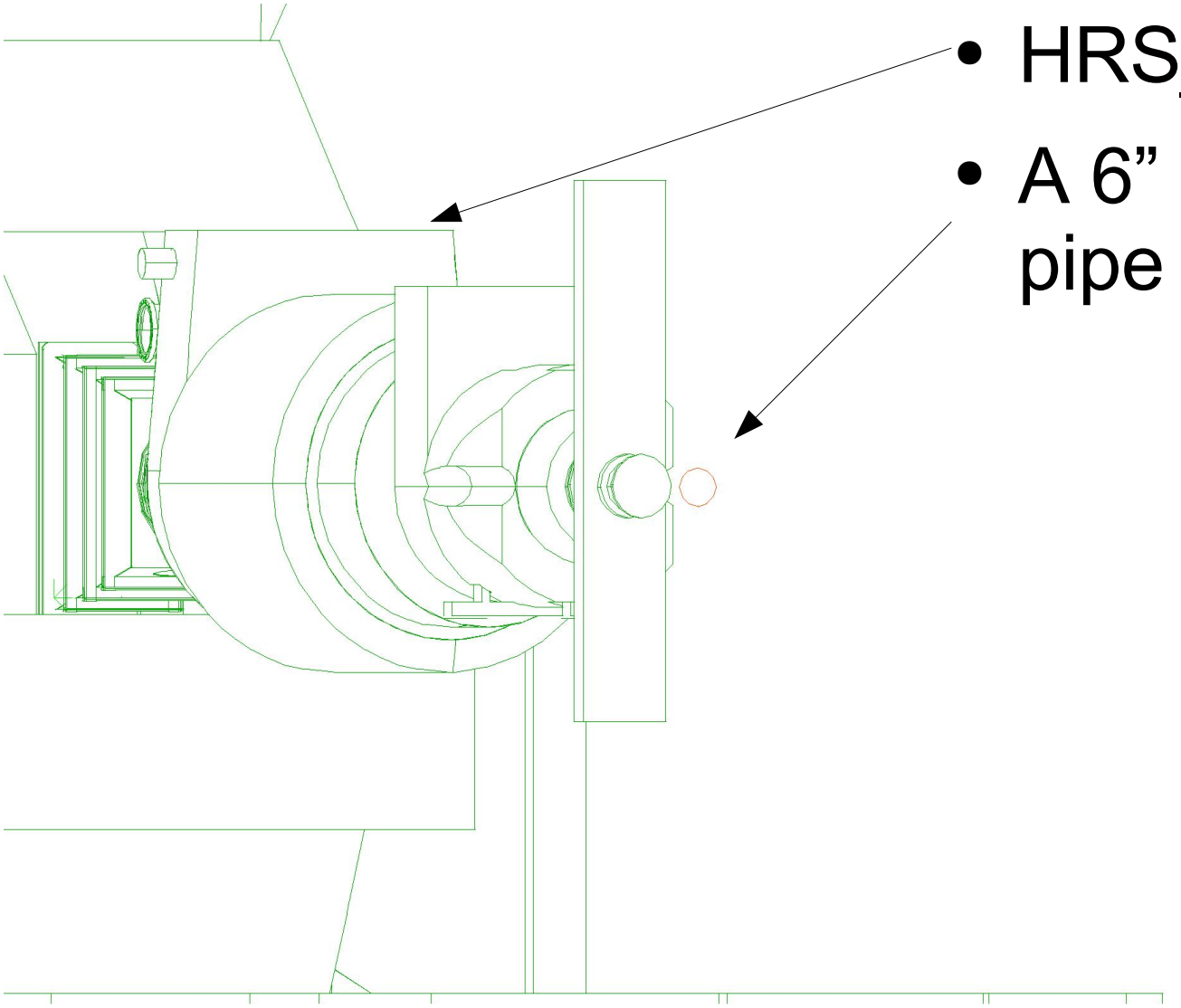
- Be more aggressive in shielding design.
- Eliminate narrow passes on beam path.
- A better design for BigBite detector shielding.
- Install a BigBite front collimator.
- Install collimator inside the BigBite magnet to block the unused low field regions.

The Downstream Pipe in Gen

- Background almost killed Gen. Shielding with wood saved the experiment.
- The narrowest point is 3.25” ID.
- For Transversity, there's enough room for a 6” beam pipe (as in DVCS).

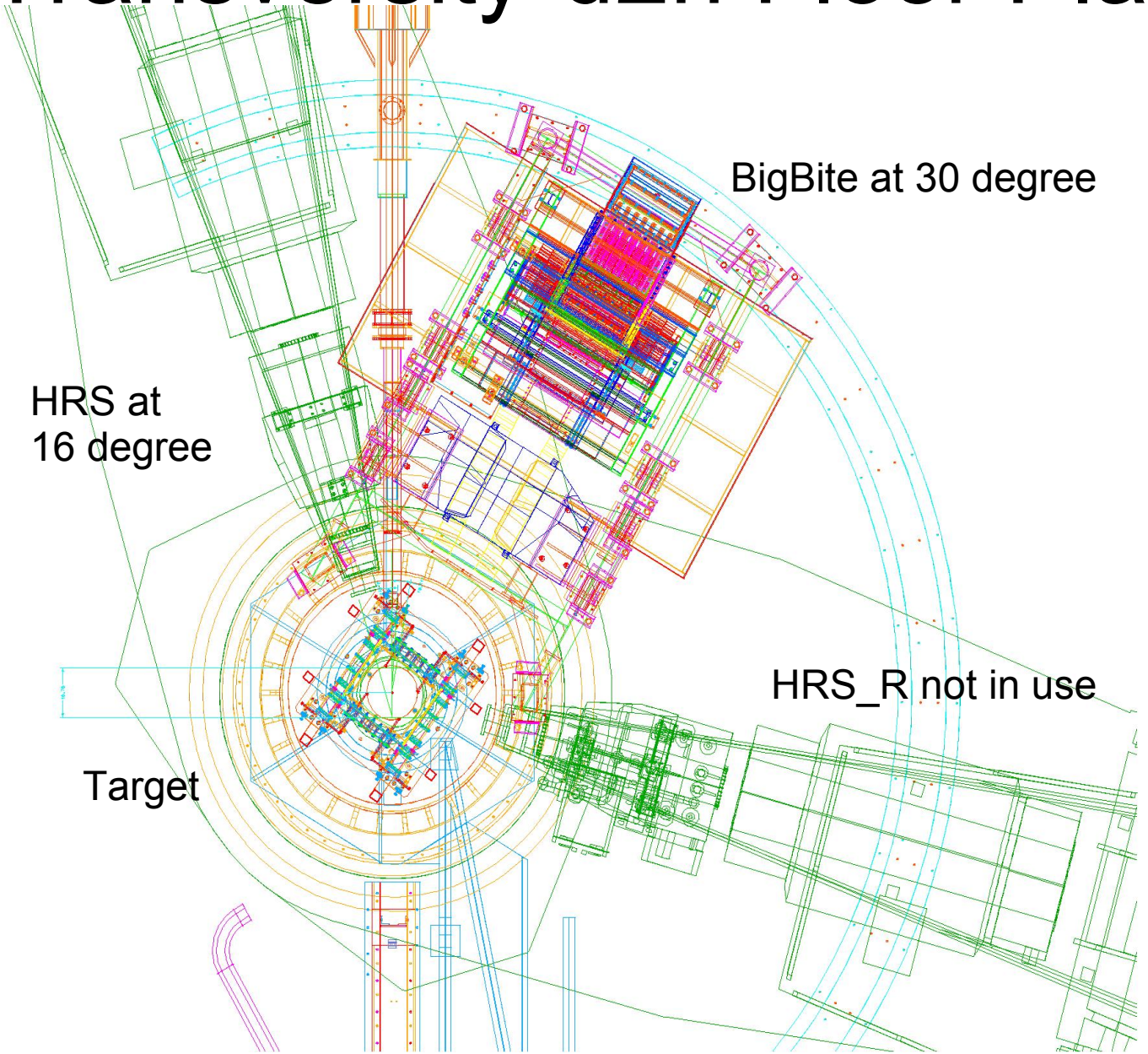
Shielding in Gen

For Transversity

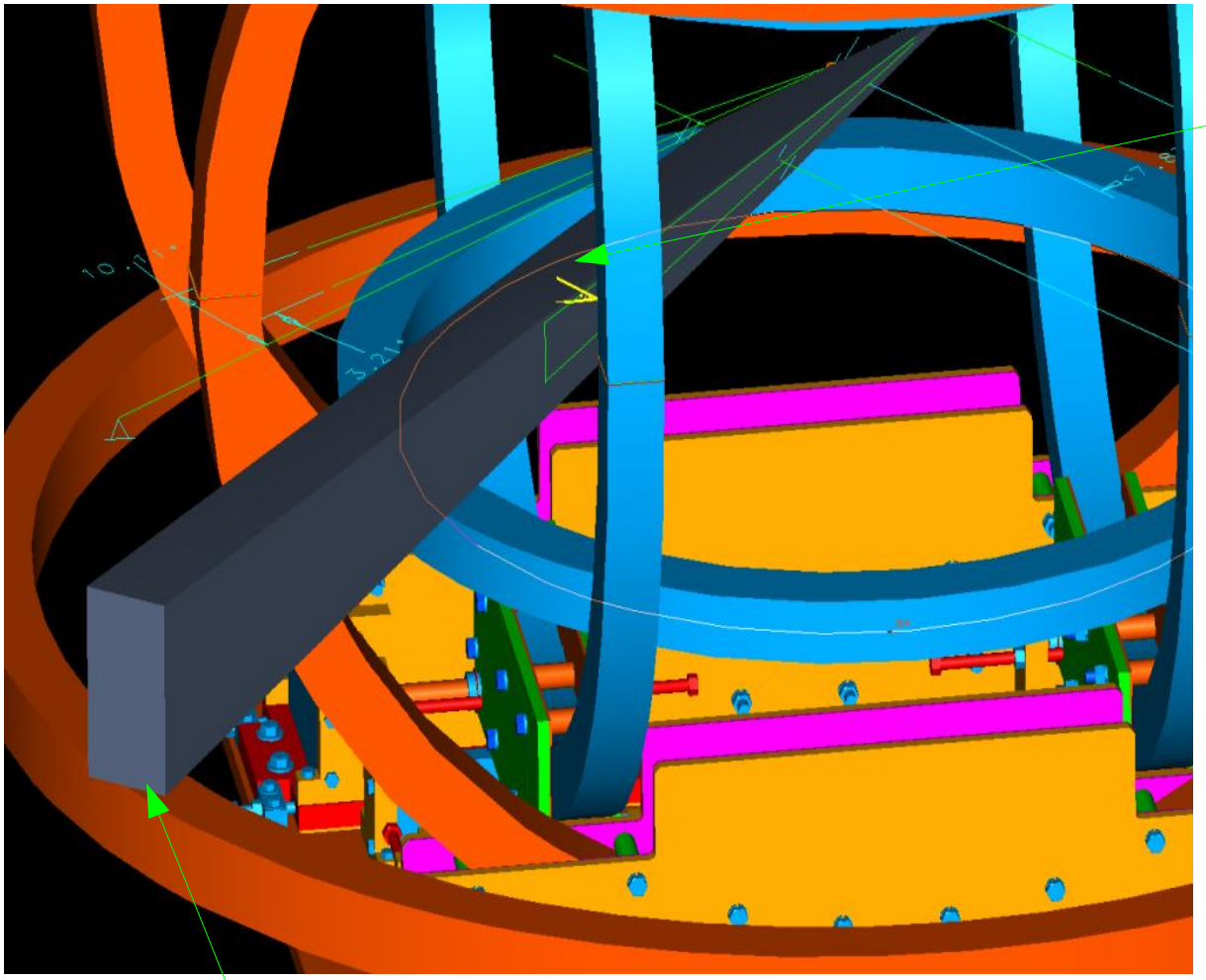


- HRS_L at 16 degree.
- A 6” OD downstream pipe fits in.

Transversity-d2n Floor Plan



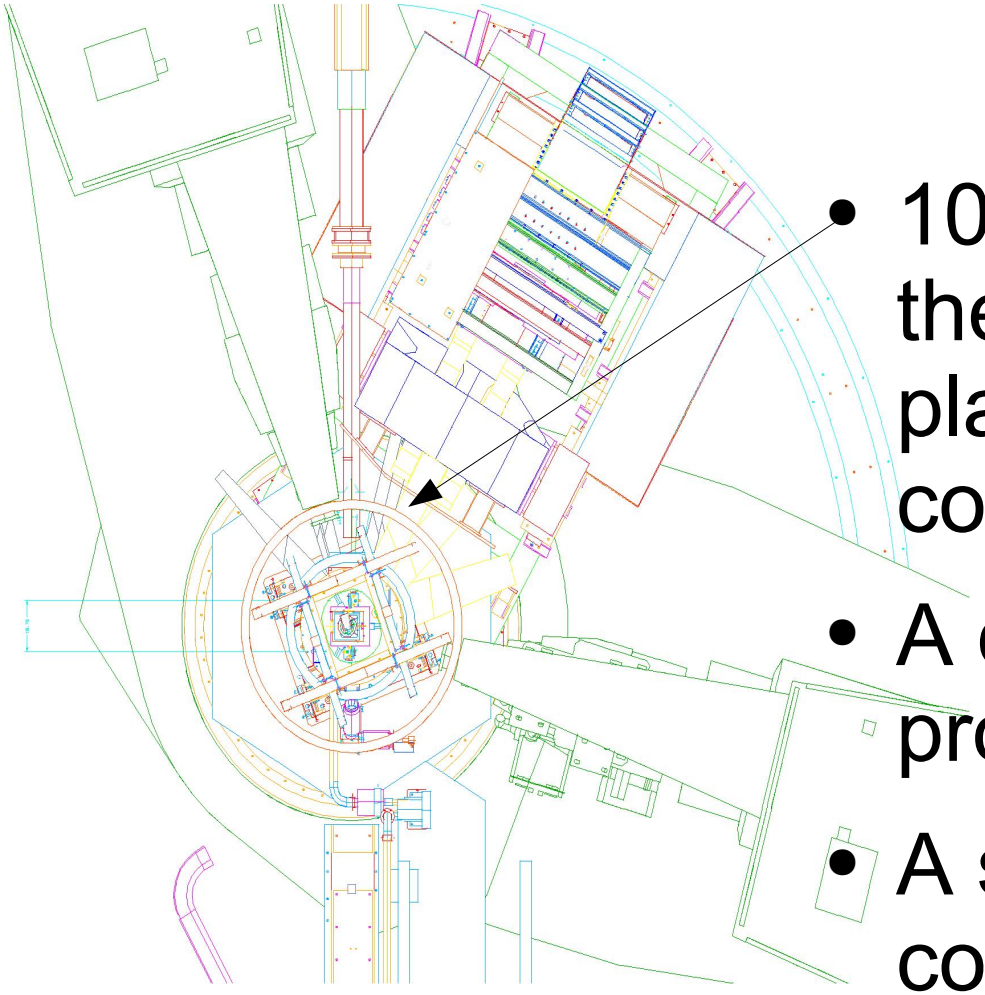
Enough clearance for the HRS_L view



Acceptance cone for HRS.

- 2.3 cm clearance between HRS_L acceptance-cone and target coil.
- Acceptance cone for 40 cm target. Boundaries based on data taken in GDH experiment.

Room for A Front Collimator

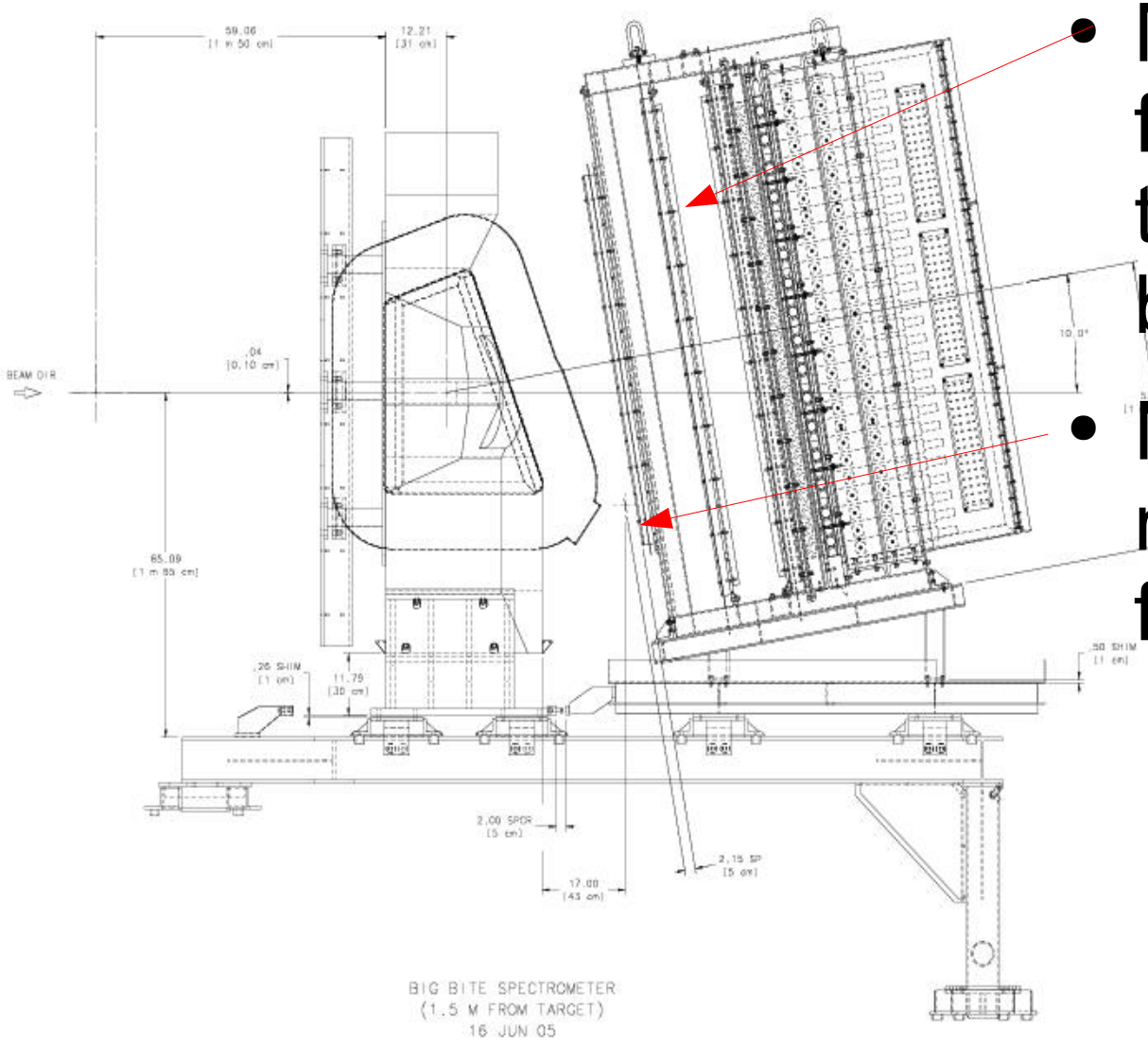


- 10” space between the magnet shielding plate and the vertical coils.
- A collimator for production data.
- A special slit collimator for Θ_t optics calibration.

What we should do: #2

- Make chamber-2 a full chamber (6 planes), put it in front of chamber-3. Tracking by 6+6+6 planes rather than 6+3+6 planes. Require plane-hits >12/18 rather than >12/15.
- Tolerate a lower efficiency on each plane. Options to run at a lower HV, or a higher threshold.
- Reduce wire chamber dark currents. (Hall C HKS chambers draw ~10 nA.)

Transversity: BigBite Detectors



- Make Ch-2 into a full chamber, move the mount point backward by 15 cm.
- Notice that there's no room left in the front.

Transversity Calibration: p(e,e') and p(e,e'p) Elastic Kinematics

BigBite single-arm p(e,e'): from the better known Φ_t obtain momentum E' calibration.

BigBite+HRS_L p(e,e'p) in central acceptance to double-check the central momentum calibration at two points.

Use 1- and 2-pass beam:

E0 GeV	Q2	E' GeV	Θ_e deg.	P_p	Θ_p	rate	coin-rate
1.24	0.35	1.05	30.0	0.62	58.1	2k	78Hz
2.43	1.17	1.80	30.0	1.25	46.1	104Hz	0.6Hz

The most difficult part of BigBite optics: Θt and momentum

- They come in always mixed.
- Need a well-defined way to tell the initial Θt and momentum for calibration.
- Can use a front slit collimator, or a front tracking wire-chamber run at low luminosity (work in progress).
- The best way is to use elastic p(e,e'p) with tagged proton. Need a large detector array.

BigBite 1.5M Drift Optics Test Plan

- The main goal is to check consistency of optics obtained at 1.1m drift vs 1.5 m drift.
- Most wanted: Θ_t and momentum optics.
- Second week (?) of May.
- Beam energy is undecided yet, depends on Gen's activity at the end.
- Might need to move BigBite and the neutron detector, depend on the beam energy.
- Prefer to be at the last Gen production kinematics.

Activities for the next two months

- BigBite 1.5m drift optics test run. CAEN TDC rate test.
- Map BigBite magnetic field at 1.5m away.
- Move BigBite detector to the test lab. Wire chamber in boxes for better protection. Sort cables.
- Set up for BigBite cosmic run in the test lab.

Activities ...

- A detailed scheme for trigger electronics arrangement.
- Decide the length of delay cables (300 signal), and obtain these cables.
- Decide on wire-chamber TDCs. Obtain Pre-Amp cards.

Design activities:

- Target coils, lefter, oven...
- Target cell design.
- Scattering chamber and coupling to the downstream pipe.
- BigBite right support wing.
- Front collimator.